

Worker Displacement during the Transition

Experience from Slovenia

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At 3 to 4 percent a year, the displacement rate for the Slovenian labor force in 1990-93 was higher than that for the North American labor force during a major recession in the 1980s. But patterns of displacement were similar.



Summary findings

Unusually rich administrative data sets covering both firms and workers enabled Orazem, Vodopivec, and Wu to study displacement in Slovenia during 1987–93.

They describe displacement trends and the characteristics of displaced workers, comparing them to those in North America during a major recession. They analyze the determinants of displacement in the framework of labor turnover, and explore factors associated with postdisplacement wage losses. Among their findings:

- A comparison of displacement in Slovenia in 1990–93 and in North America during the recession of the early 1980s shows striking similarities in the incidence of displacement by gender and industry, as well as in reemployment paths.
- Workers try to avoid displacement both by switching to another job and by leaving the labor force. Before becoming displaced, they also take wage cuts.
- Both the probability of displacement and the probability of job quits are negatively correlated with tenure.
- Women are no more likely to be displaced than men, and face smaller postdisplacement wage losses. Non-Slovenians are no more likely to be displaced than Slovenians, and face equal wage losses.
- Firm characteristics matter. The smaller and less profitable the firm, the greater the likelihood of both displacement and job-switching. Restructuring subsidies that lower firm layoff costs increase the number of firm- and worker-initiated transitions.
- About half the displaced workers who find new jobs change occupations and about a third change industry.
- Only about a third of workers displaced in 1990 had found a job by the end of 1991. Surprisingly, for more than 68 percent of them, wage growth exceeded the median wage growth in the economy (17 percent).
- Those not reemployed seem to be paying a heavy toll: Not only do they stay unemployed much longer, but they face much lower reemployment wages.
- As studies of displacement in the United States also show, greater job experience is associated with heavier postdisplacement wage losses. The magnitude of those losses is consistent with findings about U.S. wage losses.

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**WORKER DISPLACEMENT DURING THE TRANSITION:
EXPERIENCE FROM SLOVENIA**

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After years of stable employment, workers in transition economies have been confronted with job loss on a massive scale. While displacement can be justified as part of the "creative destruction" that is necessary to allocate scarce resources efficiently, it imposes a heavy toll on individuals hurt by displacement. Experience in market economies shows that the costs of displacement take two forms. First, job losses generate unemployment and thus waste of resources. Second, upon reemployment, displaced workers experience earnings losses, both in the short- and the long-run, due to the destruction of firm specific human capital entailed by the job loss.

This paper illustrates the process of displacement in transition economies, utilizing an unusually rich data set on Slovenian workers. The paper examines factors which affect firm layoffs and quits, wage setting in the face of potential layoffs, and the effect of displacement on wages for workers who are successful in finding new jobs. Among our findings are that more skilled workers are less likely to be displaced but are more likely to quit, and some workers appear to quit to avoid higher probability of layoff. We also find that prior to displacement, workers take a cut in their wages. Reemployment probabilities are influenced by both labor demand- and labor supply-side factors, and reemployed displaced workers receive real wage gains as a result of displacement. The last surprising result is shown to be driven by nonrandom selection of reemployed workers from the pool of displaced workers.

The paper opens with a brief review of the institutional environment leading to transition and the changes which have affected displacement. Following a brief overview of the stylized facts of displacement, the paper develops a simple model of turnover. The model's implications are tested using data from administrative records of the registered unemployed, the Slovenia Pension and Invalid Fund, work history data, and accounting information on firms.

1. INSTITUTIONAL BACKGROUND AND RECENT MACROECONOMIC PERFORMANCE

From the early 1950s until the 1988/89 reforms, Yugoslavia maintained a unique social and economic system known as worker self-management.¹ On paper, the system gave workers a mandate to participate in many aspects of firm decisionmaking. In practice, worker participation was limited largely to determining relative pay within the firm. As in other socialist economies, the government interfered directly in many aspects of firm decisionmaking. Directly affecting the incidence of displacement were government interventions to preserve jobs, limit wage inequality and limit firm failures.

Job security in Yugoslavia was constitutionally guaranteed. Article 13 of the constitution of 1974 stipulated that "The worker of associated labor ... has a non-alienable right to work." If technological innovations produced labor redundancies, Article 32 stipulated that the worker had to be placed into another assignment that fitted his/her abilities and skills. Except for extremely rare cases of bankruptcy, workers could be fired only for breaching work discipline or refusing job reassignment.

To limit wage variation across firms, firm wage bills were set centrally so as to limit differences in wage bills across firms of comparable size and occupational structure. Once the wage bill was set, a referendum of workers was used to set pay within the firm. The outcomes of the referenda tended to limit wage differentials by skill. The formulaic setting of wage bills explicitly limited wage gains in successful firms and limited wage reductions in unsuccessful firms. As a consequence, mandated wage bills were very low relative to earnings in the most successful enterprises, but exceeded earnings in the least successful enterprises. To prevent bankruptcies -- and to maintain job and wage security -- the Yugoslav government created numerous channels by which

¹ Until achieving independence in October 1981, Slovenia was one of the six constituent units of Yugoslavia.

income was shifted from profitable to unprofitable enterprises. Formal taxes were supplemented by an informal system of *quasitaxes* and *losses on money*.² Profitable firms were subjected to informal taxes and inflation taxes on money holdings while unprofitable firms received informal subsidies and money gains ("returns" from borrowing in an inflationary economy). These subsidies enabled the unsuccessful firms to meet their mandated payrolls.

Vodopivec (1994) quantified the different types of income transfers before transition. He found that the informal components of transfers were both larger and more variable than their formal counterparts. While formal taxes amounted to 16 percent of firm income, quasitaxes were larger by 50 percent. Losses on money were nearly four times larger than formal taxes. Formal subsidies amounted to only 0.4 percent of firm income, but quasisubsidies were 7.4 percent of income. Gains on money were 60.5 percent of income. Vodopivec also demonstrates that net subsidies (the difference between the sum of subsidies and the sum of taxes) per worker were inversely and progressively related to income per worker. That is, both taxes and subsidies were applied selectively, with only profitable firms being taxed, and only unprofitable firms being subsidized.

The Yugoslav objective to stabilize employment and wages was typical of socialist economies in general. Kornai (1980, p. 315) state that socialist governments tried to achieve "stabilization of every firm, and even of every job." Research on other socialist countries shows similar income-leveling effects of interfirm redistribution, achieved through similar means.³

Reforms During the Transition

The 1988 Enterprise Law transferred decision-making right from workers to equity owners,

² Vodopivec (1994) defines quasitaxes as appropriations of resources by one agent that were formally accounted for as financial investments by another agent. The resources appeared on the asset side of the investor's balance sheet, but were typically written off after several years (clearly, such investments were mandatory). Losses on money are defined as inflation tax on money assets held for transaction purposes.

³ See Kornai and Matits(1987) for evidence on Hungary, and Schaffer(1990) for evidence on Poland).

thus formally ending the era of self-management.⁴ The right of employers to lay off workers is perhaps the most radical break with the past. The layoff policy was implemented in two steps. First, the Yugoslav Labor Code of October 1989 gave employers the right to lay off workers, but at considerable cost. Then in February 1991, the layoff costs borne by the firm were reduced, most notably by reducing the mandated advance notification period from 24 months to 6 months.

Since 1991, workers identified as redundant were given the following entitlements. They could take reassignment within a firm, including to a job that requires fewer skills; they could be retrained; they could take early retirement with the firm purchasing their missing pension credits; or the employer could be required to keep them for at least six months and pay them at least the minimum wage.⁵ Firms bear the costs of these entitlements, but -- conditional on the submission of a restructuring plan -- the firms can be reimbursed by the government for 50 percent of the associated costs.⁶

Decisions about the restructuring program, including decisions about redundant workers, rest with the worker council (in social enterprises) or with the manager (in private enterprises). Criteria for identifying redundant workers are spelled out in the general collective bargaining agreement of August 1990. They are (in order of priority): work quality (productivity), qualifications, work experience, seniority, health, and social factors (number of dependents, whether it might be possible for the individual to work on a farm or become self-employed, and whether the individual is an owner or part-owner of a mixed or private firm).

⁴ With implementation of privatization being unduly delayed (after a two-year impasse in the parliament, the privatization bill was finally passed in November 1992), corporate governance has yet to undergo a real change. See Pleskovic and Sachs (1994) for a discussion of privatization legislation.

⁵ This last option has been dubbed "paid vacation," because redundant workers have typically not worked.

⁶ For example, in 1990 the Slovenian government cofinanced 21,223 redundant workers. Of these, 172 were trained and placed in another firm; 1,082 chose early retirement; 2,499 received a lump-sum payment; and 17,470 were on "paid vacation."

Except for workers who quit or are dismissed for disciplinary reasons, workers with at least nine months of continuous employment can qualify for unemployment compensation. The replacement rate is 70 percent, dropping to 60 percent after the first three months. The duration of individuals' eligibility to collect unemployment compensation depends on the duration of their previous employment. The duration of benefits is tied to previous work experience with a minimum duration of three months. At the upper limit, workers with cumulative employment record of 20 or more years are entitled to a maximum of two years. Before the February 1991 law change, workers laid off because of bankruptcy were entitled to twice the maximum duration as otherwise comparable workers. After their right to unemployment compensation expires, unemployed workers are eligible for means-tested unemployment assistance.

Before March 1992, men qualified for old-age pension at 60 years of age and 40 years of work experience, and women at 55 years of age and 35 years of work experience. The level of pension was 85 percent of the pension base, computed as the average of the inflation-adjusted wages in ten best years. Early retirement at reduced pension levels was available to men at 55 years of age and 35 years of work experience (50 years of age and 30 years of work experience for women). The 1992 law called for pensionable ages to increase gradually to 63 for men and 58 for women. It also stiffens the conditions for early retirement.

To alleviate the consequences of the collapse of trade within the other republics of former Yugoslavia, the government in July 1991 suspended the initiation of bankruptcy proceedings and introduced a program that subsidized employment in financially distressed firms. Firms that qualified for bankruptcy were relieved of tax obligations and of liability for electricity bills. For 1991, total employment subsidies amounted to 12.1 billion tolars (5.6 billion in unpaid taxes, 3.8 billion for unpaid electricity, and 2.8 billion in direct subsidies), or about 3.5 percent of GDP (Vodopivec and Hribar-Milic, 1993). Total subsidies represented 47 percent of expenses for labor market programs in

1991, compared with 14 percent spent on direct job creation.

The Yugoslav labor code of October 1989, improved by the Slovenian amendments of February 1991, removes administrative constraints on the wage bill, as well as collective decisionmaking about the wage scale. The most important new feature regarding wage setting is that managers are authorized to determine wages. Orazem and Vodopivec (1995) showed that wage inequality within and across firms rose dramatically when managerial wage setting was implemented.

As in other formerly socialist countries, the transition has resulted in sharp declines in output and employment. After a period of steady growth in the 1970s and stagnation during the 1980s, Slovenian GDP fell 18.6 percent during 1989-92. Reflecting the fall in production and reforms of the labor market, the unemployment rate soared from 4 percent in 1989 to over 14 percent in 1994. As shown in Table 1, Slovenia's macroeconomic performance during the transition has been similar to that of other transitional economies.

2. DISPLACEMENT TRENDS IN SLOVENIA

Perhaps the most visible and painful consequence of transition has been the escalation of unemployment. After years of virtually certain employment, workers were confronted with the prospect of displacement. As shown at the bottom of Table 2, employment plummeted and labor turnover rose dramatically. Institutional changes described above, coupled by disruptions in trade both with other Eastern European countries and particularly with other republics of former Yugoslavia, produced an accelerating trend of displacement starting in 1989.

To quantify these trends, a worker at least twenty years old who lost a job either through layoff or plant closing followed by a spell of unemployment was defined as displaced. This definition was partially prompted by available data, but still corresponds roughly to definitions used in the U.S. Survey of Displaced Workers (SDW). The main differences in the displacement definition between

Slovenia and the U.S. are that in Slovenia, the displaced are not required to have had three years of prior job experience, and there is no requirement that the displaced have a period of unemployment in the U.S. Effective differences in these definitions are not large. The vast majority of displaced workers in Slovenia were coming from a system of virtually certain employment and therefore most would meet the three year experience requirement. On the other hand, the vast majority of U.S. displaced workers do suffer some period of unemployment. Therefore, the U.S and Canadian displacement information can serve to place the Slovenian experience in perspective.

Since 1991, 3-4 percent of Slovenian workers employed at the beginning of the year became displaced. As shown at the top of Table 2, bankruptcies were responsible for all displacements initially. After the 1991 policy shift which suspended bankruptcies but allowed layoffs, layoffs became the dominant source of displacement. Under transition, displacements have represented about 30 percent of all exits from employment and 14-22 percent of inflows into unemployment.

The North American recession of the early 1980's was the steepest economic decline since World War II. Table 3 shows that displacement experienced during the Slovenian economic transition was even greater than in the U.S. and Canada. More than 11 percent of the Slovenian workforce became displaced during the four-year period, five percentage points greater than in the U.S. and one percentage point greater than in Canada. Bankruptcies accounted for just over half of all displacements in the U.S. and Slovenia, but were less important in Canada.

The demographic characteristics of displaced workers in Slovenia do not differ greatly from those in North America. Slovenian displaced workers were more likely to be female, reflecting the higher female labor force participation rates in Slovenia. Relative to North America, Slovenian displaced workers were younger, and more heavily concentrated in construction and blue-collar sectors. The incidence of displacement in Slovenian manufacturing sector was nearly identical to that in the recessed U.S manufacturing sector.

To further explore the incidence and wage loss of displacement, the next section sketches a simple model of turnover. The empirical work tests whether the theoretical expectations are borne out by the data.

3. A THEORY OF LABOR TURNOVER

Turnover in the social sector can be initiated by workers or the firm. Firms may opt to layoff unprofitable workers or workers may opt to exit to more attractive options inside or outside the labor force. Let H be the stock of general training embodied in a worker. The worker also has firm specific human capital equal to h . The output of the worker in the firm is

$$q_F = \gamma_F H + h \quad (1)$$

where γ_F is the output per unit of general training in the firm and output per unit of specific human capital is normalized to one.

The worker's earnings in the firm are given by

$$W_F = \alpha_F H + \beta h \quad (2)$$

where α_F is the return per unit of human capital in the firm and β is the workers share of returns to specific human capital. In market economies with flexible wages and mobile labor, one would expect that $\alpha_F = \gamma_F$ so that workers capture all returns to general training. This may not be true in transitional economies if labor is not free to seek its highest return or if wages are not flexible.

The worker's stream of returns from staying with the firm will be given by (2) if employment is certain. With transition, however, layoffs or bankruptcies became possible. Therefore, the returns to remaining with the firm must reflect the possibility of displacement. The probability of layoff is b_F . The stream of returns for a worker employed in the firm is

$$\begin{aligned} rV_w^F &= W_F + b_F(V_u - V_w^F) \\ &= \alpha_F H + \beta h + b_F(V_u - V_w^F) \end{aligned} \quad (3)$$

where r is the discount rate and V_u is the expected discounted lifetime earnings for an unemployed worker. If $b_p = 0$, then the worker has certain employment with the firm at W_p per period. We assume that $W_p > rV_u$ so that the firm must pay enough to insure that certain employment pays better than unemployment,⁷ otherwise the worker has no incentive to work. This restriction also implies that $V_w^F > V_u$ so that the second term in (3) is negative.

The worker has opportunities elsewhere given by

$$arV_w^0 = aW_0 + ab_0(V_u - V_w^0) \quad (4)$$

$$W_0 = \alpha_0 H \quad (5)$$

where α_0 is the return per unit of human capital elsewhere, a is the probability of getting a job elsewhere, b_0 is the probability of job loss, and rV_w^0 is the stream of return from other jobs. Specific human capital is assumed to have no value in other firms. General training is allowed to have different returns elsewhere than in the current firm. In a freely mobile labor market, $\alpha_0 = \alpha_p$.

Displacement

A firm's profit from maintaining the employment relation is the difference between the value of worker output, q_p , and the wage W_p . However, firms may keep workers when $q_p < W_p$ if the firm faces one-time firing costs, F . The firm may also qualify for one-time layoff subsidies, S . As described above, firms in Slovenia faced significant firing costs associated with mandated training, pensioning or compensation of displaced workers, but some firms had these costs cofinanced by the central government.

The firm's stream of net returns on the worker is given by

$$\begin{aligned} rV_p^F &= q_p - W_p + r(F-S) \\ &= (\gamma_p - \alpha_p)H + (1-\beta)h + r(F-S) < 0 \text{ if layoff} \\ &\geq 0 \text{ otherwise} \end{aligned} \quad (6)$$

⁷ This is similar to the argument advanced by Shapiro and Stiglitz (1984).

The subsidy raises the probability of layoff while firing costs and specific human capital lower the probability of layoff. General training would have no effect on layoffs if $\gamma_F = \alpha_F$ so that workers get all returns from general training. In (6), the effect of general training on layoffs depends on the relative sizes of γ_F and α_F . If salaries for highly educated workers were artificially constrained and those of less-educated workers artificially raised under socialism, as argued by Orazem and Vodopivec (1995), then $\gamma_F > \alpha_F$ for the most educated and $\gamma_F < \alpha_F$ for the least-educated at the start of transition. This would suggest that the probability of layoffs would decrease with the education level of the worker.

Quits

Rearranging (3) and (4) and taking the difference yields the expected return from quitting,

$$Q = aV_w^0 - V_w^F$$

$$= a \left[\frac{\alpha_0 H + b_0 V_u}{r + b_0} \right] - \left[\frac{\alpha_F H + \beta h + b_F V_u}{r + b_F} \right] \begin{matrix} > 0 & \text{if quit} \\ \leq 0 & \text{otherwise} \end{matrix} \quad (7)$$

The probability of quitting falls as h increases. The probability of being displaced, b_F , raises the return from quitting, while increases in the probability of displacement in other firms, b_0 , reduce the return to quitting.⁸ Since the probability of displacement is determined by (6), theory suggests that factors which increase the probability of displacement in (6) should also raise the propensity to quit.

General training has an ambiguous effect on quits. Unlike layoffs, however, the effect of H on quits will not be neutral even if $\alpha_F = \alpha_0$ as long as $a \neq 1$ and $b_0 \neq b_F$. The expected return to unemployment also has an ambiguous effect on quits. The sign depends upon the relative magnitudes of the layoff probabilities in the firm and elsewhere. Workers may have an incentive to quit firms with low layoff probabilities to enter firms with high layoff probabilities if the returns to

⁸ $\partial Q / \partial b_F = -rV_u + W_F / r + b_F > 0$ under the assumption that returns to certain employment, W_F , exceed returns to unemployment, rV_u . $\partial Q / \partial b_0 = (a(rV_u - W_0)) / (r + b_0) < 0$ under a similar assumption applied to alternative employment.

unemployment are sufficiently high.

The probability of quitting decreases as W_f increases. However, the effect of wages elsewhere on the quit probability depends upon the accession rate and the relative sizes of the layoff probabilities in the firm and elsewhere. Higher opportunity wages, W_0 , are more likely to induce quits when the job accession rate, a , is large and when b_f is small.

To close the model, one can specify the stream of returns from unemployment by

$$rV_u = B + a(V_w^0 - V_u)$$

where B is the unemployment benefit per period. Substituting for V_w^0 and rearranging yields

$$V_u = \frac{(r+b_0)B + aW_0}{(r+b_0)(r+a)} \quad (8)$$

which may be inserted into (7) to derive the reduced form quit condition. However, no further unambiguous predictions result.

4. DATA SOURCES

The implications of the theoretical model were tested using several data sets on Slovenian workers and enterprises, constructed from registered unemployment records, workers' earnings records and personal work histories, and accounting data on enterprises.

Data on displaced workers were obtained from the official registry of unemployed. The files include demographic characteristics, date and cause of employment termination, starting and ending date of the unemployment spell, whether the spell ended in employment or labor force exit, and support received during the unemployment spell.

For the analysis of labor turnover, we merged unemployment and work history data sets. The

latter covers post-1986 spells of employment, unemployment, out of labor force for a five percent random sample of Slovenian workers (a description of the data set is given in Abraham and Vodopivec, 1993). To include both bankruptcies and layoffs as sources of displacement, we focused on exits from employment during June 30, 1991 and June 30, 1992. Possible transitions from employment were firm-initiated displacement; quits to alternate employment; or quits to unemployment or exit from the labor force. The alternative, "stayers", are those who remain with the same firm until June 30, 1992. Firm-initiated displacements were those who lost jobs due to layoff or bankruptcy. Quits which resulted in reemployment within 30 days were viewed as moving to alternate employment. Other quits were to extended unemployment or exits from the labor force. When there were multiple transitions within the year, only the first was included.

There are reasons to believe that the unemployment register data is of high quality. Those with as little as nine-months of continuous employment were eligible for unemployment compensation as well as a range of other benefits, so most of those displaced from steady employment had an incentive to register.⁹ Information on transition out of unemployment is also reliable. An unemployed worker who succeeds in finding a new job must retrieve his "work booklet" from the employment office and bring it to his new employer, triggering a record for exit to a job.

There are differences between registered unemployed and unemployment as formally defined by the International Labor Organization (ILO). A comparison with the Slovenian labor force survey shows that only a subset of registered unemployed is counted as unemployed by the survey, and vice versa. Between 1989 and 1991, about 80 percent of those found unemployed by the survey were registered as unemployed at an employment office. Most of the unregistered unemployed were school-

⁹ These benefits included training, access to night classes, cofinancing of internships, employment subsidies, child care subsidies, priority in queues for renting or buying apartments, eligibility for child allowances and voluntary old-age insurance, and even a lower likelihood that a spouse will be laid off (redundancy decisions took into account whether or not there were other unemployed in the household).

leavers or short-term employees who would not qualify for unemployment compensation". On the other hand, the survey also shows that not all registered unemployed are unemployed as measured by the ILO standards. According to the survey, in 1990, 42 percent of registered unemployed were performing paid work at least one hour in the reference week, although until 1994, legislation allowed such irregular work without any reduction in unemployment compensation. There is also the possibility of employment in the gray economy (informal employment which avoids payment of taxes) while receiving unemployment benefits. For the present analysis of labor turnover and postdisplacement wage growth, it is important to emphasize that the unemployed will include also those with irregular or gray economy earnings.

Information on pre- and post-displacement jobs and earnings were obtained from the Slovenian Pension and Invalid Fund. The Fund collects data on hours and earnings for all workers who are paying contributions to the Fund. Similar to other transitional economies, old-age insurance is mandatory so virtually all workers are covered. This data was merged with the employment history files which contained information on education, job tenure and work experience, and other personal characteristics. These two sources were also available for a reference group of continuously employed workers. Hourly wages were computed as earnings divided by hours. Given that wages are computed over the employment spell, monthly dummy variables are used to construct "deflated" hourly wage, purged of the effects of changes in consumer prices over the spell. Details on data collection procedures and processing of data are reported in Orazem and Vodopivec (1995).

The theory required information on firm layoff subsidies and firm returns to the employment relationship. Accounting data for all incorporated firms in the "economic sphere" (all sectors of the economy except health, education, and government) provided profit and loss statements, firm employment, and firm receipt of restructuring subsidies. These firm level data were merged into the individual data using common firm identifiers.

This data set compares favorably to data used to study displacement in the U.S. It combines the advantages of detailed individual information, a strength of the U.S. Displaced Workers Survey (DWS),¹⁰ and the accuracy of official earnings records, a strength of recent studies based on quarterly U.S. Unemployment Insurance (UI) payment records.¹¹ At the same time, this data set avoids the recall bias of the DWS and the limited individual information of the UI records. To our knowledge, the Slovenia unemployment data is also uniquely able to measure firm profits, differential layoff costs, and the proximate cause of unemployment.

5. EMPIRICAL ANALYSIS

Transitions out of employment

The theory generated several predictions regarding transitions out of employment. First, job tenure, a proxy for firm-specific human capital, is expected to lower the probability of both displacements and quits. Displacement subsidies raise the probability of layoff, as would low firm returns on the employment relationship. Similarly, subsidies and low firm returns would raise quit propensities through higher b_f . General human capital, as measured by labor market experience and education, has ambiguous effects on turnover although past overpayment of the least-skilled and underpayment of the most-skilled would suggest an inverse relationship between layoffs and skill. Other control variables included in the analysis include ethnicity, gender, appointment type, firm size, firm ownership type and industry.

The analysis uses a multinomial logit specification. Table 4 contains the predicted probability of transition associated with each regressor. The outcomes are broadly consistent with the theory. Most impressively, all 13 variables with significant coefficients in the displacement equation had the

¹⁰ Papers which use the DWS include Seitchik and Zornitsky (1989), and Swaim and Podgursky (1987).

¹¹ See, for example, Jacobson, Lalonde and Sullivan (1993a,b).

same sign in at least one of the two quit equations, consistent with the predicted effect of h_t on quits.

As years of job tenure increase, probability of all transitions tends to decline. The only exception of note is the higher probability of exiting the labor force for those with 20+ years of job tenure, a pattern that is replicated in the effects of overall experience on labor force exits¹²

Displacement subsidies increased both firm- and worker-initiated transitions. Displacement was 51 percent more likely for workers in subsidized firms than for comparable workers in firms not receiving the subsidies. The presence of subsidies also induced quits by increasing the probability of displacement in the firm. Workers in firms receiving the subsidies were 43 percent more likely to switch firms and 21 percent more likely to exit the labor force.

Firms with low values of γ_F relative to α_F are presumably those in the lowest profitability quartile. Workers in these low profit firms were nearly twice as likely to be displaced as comparable workers in normal profit firms. In contrast, workers in top quartile profit firms are 41 percent less likely to be displaced. Workers in low profit firms are 51 percent more likely to switch firms, but firm profits do not significantly affect labor force exits.

There is some evidence that the probability of displacement is inversely related to general skills. While the sign patterns are strongly consistent with priors, most coefficients are insignificant. Propensity to quit to alternate employment is positively related to education level while propensity to exit the labor force is inversely related to education level. Job experience has no systematic effect on propensity to change firms, but it lowers propensity to exit the labor force until retirement age.

One might think that transition would be accompanied by an increase in discriminatory treatment of women and ethnic minorities. However, women were not significantly more likely to be

¹² This is certainly due to retirements by high tenure/experienced workers. Orazem and Vodopivec (1995) argued that this movement of experienced workers out of the labor force corresponded to increases in the value of pensions relative to wages. Unlike wages, pensions were fully indexed to inflation. Thus, pensions maintained their real value during transition, while real wages fell on average of 35 percent.

displaced or to quit, nor were non-Slovenes significantly more likely to be displaced. Non-Slovenians (most of them being Croats, Muslims, and Serbs) were apparently less likely to switch jobs, and much more likely to withdraw from the labor force. Persons in the "nationality missing" category--whose parameters strongly resemble the ones of non-Slovenians--were those not included in the March 1991 census. Most of these are probably non-Slovenians.

Small turnover effects are associated with private ownership and foreign ownership. Larger differences in turnover exist across industries. Turnover differences also exist between different sized firms. Workers in the smallest firms have higher probability of layoff or job switch but a lower probability of exiting the labor force.

Cost of Impending Displacement

A recent topic of considerable research in the U.S. has been to measure the cost of worker displacement. Papers by Hamermesh (1987); Topel (1991); and Jacobson, Lalonde and Sullivan (1993a,b) used the samples of displaced workers to measure lost earnings from job loss. The value of using displaced workers, defined as workers who lost jobs from mass layoffs or plant closings, as opposed to all job losers, is that mass layoffs are less likely to be due to unobserved individual worker productivity. Consequently, wage changes for displaced workers will more accurately reflect the costs of exogenous job loss whereas other job losses may reflect revealed low worker productivity.

Hamermesh found no evidence of slower wage growth for displaced workers in the years before displacement. However, Jacobson et al found large and significant wage losses for displaced workers in the three years before the displacement occurred. They argued that the predisplacement wage loss was part of the same process that led to displacement and further post- displacement wage loss. Before displacement, troubled firms attempted to avoid layoffs by holding back on wage increases or instituting wage cuts.

The empirical model of labor transitions showed that workers respond to the prospect of displacement by switching jobs or by withdrawing from the labor force. Displacement might also be prevented by accepting wage cuts, as found by Jacobson et al. To investigate that question, we estimated a log wage equation. In addition to standard demographic characteristics, human capital variables and industry controls, the regressors included a dummy variable which took the value of one if the person was displaced later in the year. The displacement dummy was interacted with the other variables to test whether differences in returns to human capital and demographic attributes existed before displacement occurred.

We find that workers who experienced displacement later in 1990 were indeed paid less than otherwise identical workers. The wage loss amounted to 12 percent for a Slovenian male in manufacturing holding a vocational degree with three to five years of experience. The wage loss varies across skill groups, with the largest percentage wage losses for university educated workers and for those with at least 10 years of job experience.

Other things equal, equation (7) predicts that below normal returns to general training should induce quits to enter alternative employment. The pattern holds for education groups in Table 4—the education groups losing the least in Table 5 are the least likely to switch firms, those losing the most in Table 5 are the most likely to switch firms. The quit relationship for experience is less clear cut.

The pre-displacement wage loss was three percent smaller for women than for men. There were no significant differences in predisplacement wage loss across ethnic groups.

Workers employed in services and finance and real estate had the largest predisplacement wage losses. Workers in construction actually received wage gains before being displaced. With pending privatization, wages could have been raised artificially, forcing the enterprise into bankruptcy and enabling subsequent acquisition of firm shares by its workers. Predisplacement wage losses also varied across regions. Wage losses before displacement were largest in the most agricultural regions

of Slovenia.

Postdisplacement Employment and Wages

Table 6 contains stylized facts about the workers in Slovenia who were displaced. For purpose of comparison, statistics on U.S. and Canadian displaced workers are included. Roughly one-third of displaced Slovenian workers found reemployment within the period, half the reemployment rate in the U.S. and Canada. Slovenian men are marginally more successful than women in finding new employment. Nevertheless, half were still unemployed at the end of the period, more than double the proportion unemployed in the other countries. Both supply- and demand-side explanations potentially explain the relatively slow exit rate from unemployment in Slovenia. On the demand-side, slow job creation during transition left few opportunities for the displaced, particularly in social sector jobs. On the supply-side, unemployment compensation durations of up to two years (four years before 1991) may have limited incentives to accept jobs. There was also a possibility of supplementing unemployment income with part-time informal sector or home production jobs while remaining officially unemployed, further raising reservation wages for formal sector jobs relative to formal sector wages.

Displaced Slovenian workers who found new jobs generally received real wage gains. Over 68 percent of Slovenia workers who found employment received postdisplacement wages above their previous wage. Only 31 percent took pay cuts, in contrast to 44 percent in the U.S. and 56 percent in Canada. Clearly, those displaced Slovenian workers who found reemployment were unique, so the wage results are subject to considerable selection bias. In particular, if opportunity costs for accepting formal sector employment were high, only those with unusually good market opportunities would be induced to accept new employment.

Another complication faced by displaced workers seeking employment is the likelihood of changing occupation or industry. As shown in table 7, only about half of the reemployed workers

found employment in the same occupation. The group least likely to change occupations is the unskilled with 72 percent staying in the same occupation. The employment indexes show that the occupational mix is not stationary--the number of displaced workers finding jobs as managers was more than twice the number of displaced managers. On the other hand, the number of displaced finding jobs in the professional, administrative support and semi-skilled occupations is smaller than the number of displaced from those occupations. Occupations show signs of both downward and upward mobility. A large proportion (43 percent) of the successful semi-skilled job seekers found reemployment as unskilled workers. In contrast, 17 percent of successful professional job seekers and 7 percent of reemployed administrative support workers became managers.

Industry reemployment paths reinforce the conclusion that displaced must vigorously adjust to find a job. About one-third of the reemployed workers changed broad industry of employment. The most mobile were those in trade, government and transportation, while reemployed construction workers largely remained in the construction sector. Construction, manufacturing, and government lost more workers than they reemployed while trade and financial services hired more displaced than they displaced.

Probability of Reemployment and Wage Loss

The surprising finding from Table 6 that average wages for reemployed displaced workers rose is conditional on reemployment status and holds no other individual attributes fixed. To generate comparative static estimates of wage changes from displacement, designate the difference in log wages between 1991 and 1990 as $\Delta \ln W$. Define X as a vector of human capital attributes and personal characteristics, $R2$ is a dummy variable indicating whether the worker is reemployed in the same two-digit industry and $R4$ is a dummy variable equal to one when the worker is reemployed in the same four-digit industry. In addition, let $\Delta \ln W_r$ be the log change in the reference wage, defined as the unconditional change in log mean wages for continuously employed workers in the same

education/industry/experience cell.

We estimate

$$(\Delta \ln W - \Delta \ln W_r) = X\beta + R2\gamma + R4\delta + \epsilon \quad (9)$$

where the parameters are interpretable as the effect of the regressor on wage growth for displaced workers relative to those who were not displaced. Ignoring wage changes in the reference group by replacing the dependent variable in (9) with $\Delta \ln W$ will generate parameters interpretable as the effect of the regressors on wage growth relative to other displaced workers. The estimates of equation (9) will be conditional on observing pre- and post-displacement earnings. Therefore, we select out all displaced workers who fail to find a job by the end of 1991. Reemployment is undoubtedly correlated with the observed attributes, X , as well as variables linked to incentives to search for or accept reemployment.

Let I be an index which represents the value of accepting reemployment following displacement. I is assumed to be a function of the human capital variables in (9), factors which reflect nonmarket productivity, Z , and beliefs concerning the distribution of wages, W .¹³ The index function is of the form

$$I = X\theta_1 + Z\theta_2 + W\theta_3 + \xi \quad (10)$$

so that $E = 1$ if $I > 0$ and $E = 0$ otherwise, where E represents employment. Assuming ξ and ϵ are distributed bivariate normal, a correction for the presumed nonzero conditional mean in (9) is to estimate

¹³ This reduced-form specification is justified by comparing the value of being unemployed, V_u , with the value of accepting employment V_w^0 . V_u acts as a worker's reservation wage. The worker accepts a job only if $V_w^0 > V_u$. Elements of Z act in the role of unemployment benefits, B , in (8). Elements of W act in the role of the worker's beliefs about the accession rate, a , layoff possibility, b_0 , and expected wages, W_0 in (8). The selection process is identified because B and W do not directly affect an individual firm's wage offer but they do affect the worker's beliefs about V_u .

$$(\Delta \ln W - \Delta \ln W_r) = X\beta + R2\gamma + R4\delta + \lambda \frac{f(1-\xi)}{1-F(1-\xi)} + \mu \quad (11)$$

where μ is a random error with zero mean, f is the normal density function and F is the normal cumulative distribution function.

Unfortunately, the subset of the displaced who became reemployed in the employment history data set is too small to yield reliable estimates of equation (10). Therefore, equation (10) was estimated using data from the universe of displaced workers among the registered unemployed, for those workers for which we observe their predisplacement wage.¹⁴ There were 5,462 such displaced workers in 1990, and for 904 we observed their postdisplacement wage by the end of 1991.¹⁵ The disadvantage of the registered unemployed data set is that there is no information on firm characteristics and worker tenure. Nevertheless, the data allow sufficient instruments to identify the probability of exit from unemployment.

Elements of Z include presence of dependents, per capita farm land in the locality, and the level of unemployment benefits which are tied to the level of the previous wage.¹⁶ Dependents would raise the formal sector reservation wage by raising home productivity. Areas with more farm land would have more opportunities for irregular, gray economy or home production, also increasing the reservation wage. Elements of W include the predisplacement local unemployment rate and a Herfindahl index for industrial mix in the locality. Higher local unemployment rates serve as an

¹⁴ Our data set on earnings included information on predisplacement earnings for 54 percent of workers displaced in 1990. Various reasons that contributed to incomplete merging of work history and unemployment data with earnings records are discussed in Orazem and Vodopivec (1995). There are no reasons to believe that omissions are nonrandom.

¹⁵ Of workers displaced in 1990, 34.3 percent found a job within a year from displacement. Somewhat lower reemployment rate implied by the above numbers results from previously mentioned omissions in our data set on earnings.

¹⁶ The unemployment benefit was set at 70 percent of the predisplacement wage.

index of the magnitude of the adverse labor demand shock in the locality. Higher Herfindahl indexes imply fewer choices of industries in which to search in the local labor market. Table 7 showed that about half of the displaced workers who successfully found jobs switched industries. Those displaced in a local labor market with only one employer would not have alternate sectors in which to search. Higher unemployment rates and Herfindahl indexes are expected to increase the search effort required to find a job.

Table 8 reports the Probit equation for the probability of becoming reemployed. While the primary purpose of this estimate is to generate the selection correction for equation (11), the estimates have interest in their own right. What is particularly interesting is the performance of the local labor market and household production instruments. The unemployment rate of the locality at the time of displacement, per capita farm land, and Herfindahl index of industry concentration significantly affect the probability of becoming reemployed in the way predicted above. The presence of dependents also has the predicted sign but is insignificant. Those with higher predisplacement wages are more likely to exit unemployment, perhaps because the opportunity cost of remaining unemployed exceeds the value of higher unemployment benefits. Workers with elementary and vocational education are less likely to reemploy within a year, as are those with the most prior work experience.

The estimation of variants of equations (9) and (11) are reported in Table 9. Note first that the selectivity correction variable, λ , is highly significant. Since its exclusion biases the results, we concentrate on the results that correct for selectivity. They show that reemployment wage growth vary across workers with different demographic and human capital characteristics. Greater experience is found to significantly reduce wage growth. The effect becomes statistically significant for those with 10 or more years of experience, whose wage growth is reduced by 11 percent. The wage loss for those with 25 to 30 years of experience is 36 percent. A plausible explanation is that experience - instead of tenure, for which we do not have information - captures the loss of specific human

capital from displacement. The magnitude of the wage loss for experienced workers is comparable to that found by studies of displacement in market economies.¹⁷

The results reveal no systematic relationship between the wage growth and education. Both the least and the most educated experienced larger wage growth, but the differences from other education groups were insignificant. As an investment in general human skills, education did not appear to lose value from displacement.

Women's postdisplacement wage growth was larger than men's by 7 percent. Evidence from other studies is mixed. For example, Jacobson, LaLonde and Sullivan (1993) reported that men's short-term reemployment losses were larger than women's; Podgurski and Swaim (1987) found the opposite. We also find that the wage growth of displaced Non-Slovenians exceeded that of Slovenes by 12.5 percent. In the light of growing ethnic tensions in the 1990s, this is a surprising result. Abraham and Vodopivec (1993) found significantly smaller transition rates from unemployment to employment for non-Slovenians in 1989 and 1991, but Orazem and Vodopivec (1995) found no evidence of wage discrimination against Non-Slovenians either before or after transition began.

The results also show that reemployment in the same broad, two-digit industry is associated with faster wage growth, but remaining in the same four-digit (as well as the same two-digit) industry eliminates the gain. Evidence summarized in Hamermesh (1989) suggests that workers who change industries suffer greater wage losses.

The effect of selection on estimated wage growth is most dramatically demonstrated by the difference in the intercept terms in columns one and two of Table 9. The constant term changes from a positive value in the uncorrected equation to negative in the selectivity corrected equation. Since

¹⁷ Topel (1991) placed the cost of displacement for workers with 20 years of tenure at 40 percent wage loss. Jacobson, Lalonde and Sullivan (1993) found wage losses averaging 25 percent across experience groups. Hamermesh's (1987) estimates show average wage losses of 28 percent for displaced workers with 11-20 years of seniority.

the constant term measures the average wage change for the baseline individual, it is clear that the earlier reported positive average wage gains by displaced workers is an outcome of the selection process. In the latter equation, the constant term and the selectivity correction evaluated at the sample mean cancel out, indicating zero wage growth for a baseline person (a Slovenian male with vocational education and three to five years of experience), adjusted for the reference wage growth as defined above.

Sharp differences in estimates produced by selection correction procedure and the significance of the selectivity correction variable indicate that selection plays a major role in determining wage growth of displaced workers. We find that positive selection occurs -- that the same unobserved factors which help the displaced find jobs also contribute to their higher wage growth.¹⁸ The implication is that for workers not (yet) reemployed and thus excluded in the wage growth equation, we can expect wage growth below that which we find for our sample of reemployed workers. Indeed, since the mean value for λ for those excluded in equation (11) is lower than that for those who reemployed, our estimates imply that, upon reemployment, a baseline person from the excluded group would suffer wage losses compared with predisplacement wages.

6. CONCLUSION

Transition of former socialist economies produced a phenomenon previously unknown to these economies: displacement. Unusually rich administrative data sets covering both workers and firms enabled us to study this phenomenon for Slovenia, during 1987-1993. We described displacement

¹⁸ Swaim and Podgurski (1987) show in the context of a job search model that positive selection can be interpreted as reemployed workers receiving higher wage offers than those who do not reemploy.

trends as well as characteristics of workers displaced, and compared them to those in market economies during a major recession. We also analyzed determinants of displacement in a broader framework of labor turnover, as well as explored factors associated with postdisplacement wage losses. The major findings of the study are the following.

- Displacement in Slovenia during 1990-1993, amounting to 3 to 4 percent of labor force per year, exceeded displacement during the recession of the early eighties in North America. There are striking similarities between the two in the incidence of displacement regarding age, gender, industry of displacement, as well as reemployment paths.
- Workers try to avoid displacement by both switching to another job and exiting the labor force. We also find that, before becoming displaced, workers take a cut in their wages.
- Probability of displacement is negatively correlated with tenure, as is the probability of job quits. We also find that in the year before becoming displaced, displaced workers had lower wages than otherwise comparable workers who did not lose their jobs.
- Women are no more likely to be displaced than men. Non-Slovenians are not more likely to be displaced than Slovenians. Women face smaller post-displacement wage losses than men, and non-Slovenians face equal wage losses.
- Firm characteristics matter. The smaller and the less profitable the firm, the larger the likelihood of displacement as well as of job-switching. Restructuring subsidies which lowered firm layoff costs increase both firm- and worker-initiated transitions.
- About half of the displaced workers who find new jobs change occupations, and about one third change broadly defined industry of employment.
- Only about one third of workers displaced during 1990 found a job by the end of 1991. Surprisingly, for over 68 percent of them, wage growth exceeded the median wage growth in the economy. The median gain was 17 percent. The group which did not reemploy seems to

be paying a much larger toll: not only are the workers staying unemployed much longer, but they face much lower reemployment wages. It is possible that they did not reemploy because their reservation wage is raised relative to available market opportunities by both unemployment compensation and pay from irregular or gray economy employment. If that is the case, their unemployment income may dominate their market income prospects.

- Similar to studies of displacement in the U.S., we find that greater job experience is associated with larger postdisplacement wage losses. The magnitude of these losses is consistent with findings of wage losses in the U.S.

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